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ABSTRACT

These two bulletins list references on the uses of calculators in education. They were published in April and October 1982 to provide teachers and other interested persons with sources of information about calculator activities and research findings. Sections list references on activities for students, K-12; research reports, K-12; miscellaneous, K-12; and references at the college and other post-secondary levels. Most references are annotated. (MNS)

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Reference Bulletin No. 29
April 1982

REFERENCES TO CALCULATOR USES IN EDUCATION

References were selected from those collected since Bulletin No. 28 was compiled in August 1981. They are grouped by type and by level.

ACTIVITIES FOR STUDENTS, K-12

Adkins, Bryce E. Using a Calculator to Find the "Greatest Common Factor". School Science and Mathematics 81: 603-606; November 1981.

Bestgen, Barbara J. Calculators - Taking the First Step. Arithmetic Teacher 29: 34-37; September 1981. This step-by-step plan for introducing calculators in grades 1 through 6 includes a sequence of activities.

Bitter, Gary. Five, Six Math is Kicks When You Seven, Eight CALCULATE! Instructor 91: 130-133; September 1981. A step-by-step guide to teach elementary children how to use a calculator is presented.

Duea, Joan and Ockenga, Earl. Classroom Problem Solving with Calculators. Arithmetic Teacher 29: 50-51; February 1982. Students are encouraged to write their own problems to be solved with a calculator.

Goodman, Terry. Calculators and Estimation. Mathematics Teacher 75: 137-140, 182; February 1982. Worksheets provide practice in estimating answers using multiplication and division.

Hartman, Janet. Approximating Logarithms Intuitively. Mathematics Teacher 74: 276-277; April 1981. A process for developing the approximate values of the logarithms for 2 through 9 is presented; these values are compared with calculator-generated logarithms.

Hollombe, Libby and Lubin, Lee. Calculator Blast-Off: Problem Solving in the Basic Skills. Oak Lawn, IL: Ideal, 1979, 1980. Two sets of duplicator masters provide activities on basic mathematical skills and problem solving.

Miller, Goeffery. Working Backwards to Achieve Understanding. Arithmetic Teacher 29: 48; September 1981. Fifth- and sixth-graders worked through calculations on their calculators until they arrived at a word answer; then they learned to design similar problems.

Miller, William A. Calculator Tic-Tac-Toe: A Game of Estimation. Mathematics Teacher 74: 713-716, 724; December 1981. Three activity sheets require estimation of problems, quotients, and powers in various tic-tac-toe configurations.

Morris, Janet. How to Develop Problem Solving Using a Calculator. Reston, VA: National Council of Teachers of Mathematics, 1981. This collection of activities illustrates ways to develop problem-solving techniques using a calculator.

SE040357

O'Neil, David R. and Jensen, Rosalie. Let's Do It: Let's Use Calculators. Arithmetic Teacher 29: 6-9; February 1982. Nine calculator activities for elementary grades are presented.

Prigge, Glenn R.; Gawronski, Jane D.; and Vos, Kenneth E. Using the Calculator in Geometry. Portland, ME: Walch, 1981. This set of 50 visual masters illustrates more than 25 geometry topics.

von Kaenel, Pierre A. Math Seminars for Gifted High School Students. School Science and Mathematics 82: 254-258; March 1982. "Calculating Machines" is suggested as 1 of 6 topics to be explored by gifted junior high students.

Wiebe, James H. Using a Calculator to Develop Mathematical Understanding. Arithmetic Teacher 29: 36-38; November 1981. Using four-function calculators to develop understanding of square roots and basic operations on whole and rational numbers is described.

Woodward, Ernest. Calculcators with a Constant Arithmetic Feature. Arithmetic Teacher 29: 40-41; October 1981. Activities are presented using the constant arithmetic feature in the elementary grades.

Writt, Elinor J. Mr. Manning's Money. Arithmetic Teacher 29: 47; September 1981. A problem demonstrating the usefulness of a calculator is given, with answers at two levels of difficulty.

RESEARCH REPORTS, K-12

Albina, Melvis Ann. The Effects of Using Two Types of Calculating Devices on the Computational Skills of Selected Third and Fourth Grade Students. (University of Akron, 1981.) Dissertation Abstracts International 42A: 1038; September 1981. Twenty-seven learning-disabled students in grades 3 and 4 were randomly assigned to one of three experimental groups: using four-function calculators, using preprogrammed feedback "calculators", or control. The two calculator groups used calculators 20 minutes a day for 20 days to practice basic facts. Performance of those using four-function calculators was significantly better than that of the other two groups.

Behr, Merlyn J. and Wheeler, Margariete Montague. The Calculator for Concept Formation: A Clinical Status Study. Journal for Research in Mathematics Education 12: 323-338; November 1981. Children in kindergarten and grade 1 (n = 30) used successive punches on a calculator as a means for counting. Each child was given 16 tasks in two individually taped interviews. They could maintain a one-to-one correspondence between punches and objects and could model counting strategies known to be used to process addition and subtraction facts.

Connor, Philip J. A Calculator Dependent Trigonometry Program and Its Effect on Achievement in and Attitude Toward Mathematics of Eleventh and Twelfth Grade College Bound Students. (Temple University, 1981.) Dissertation Abstracts International 42A: 2545-2546; December 1981. A trigonometry course was developed which was dependent on the use of a calculator. A comparison of two calculator and two noncalculator trigonometry classes indicated no significant difference between groups in achievement and no significant change in attitude toward mathematics. However, achievement on supplementary topics by the calculator group was significantly better.

Dye, David L. The Use and Non-Use of Calculators on Assessment Testing. St. Paul, MN: State Department of Education, 1982. ERIC: SE 036 033. Eighth-grade students were given

one form of a mathematics assessment instrument. Control students did not have access to calculators. One experimental group was issued calculators for the test and the other was allowed to bring and use calculators if desired. On only 8 of the 42 test items could calculators be used to advantage. The use or nonuse of a calculator did not make any difference in the final score.

Murphy, Nancy K. The Effects of a Calculator Treatment on Achievement and Attitude Toward Problem Solving in Seventh Grade Mathematics. (University of Denver, 1981.) Dissertation Abstracts International 42A: 2008-2009; November 1981. Students (n = 162) were divided into calculator or noncalculator groups for 6 weeks of problem-solving study. At the end of the experiment, both experimental and control groups were divided into calculator or pencil-paper posttest groups. The students who were provided with unrestricted use of calculators achieved higher in problem-solving posttest scores and also in several specific components of problem-solving skills. The treatment did not significantly affect student attitudes.

Schoen, Harold L. et al. The Iowa Problem-Solving Project: Development and Evaluation. August 1980. ERIC: ED 199 052. This report discusses the development and evaluation of methods of teaching problem solving while incorporating calculator use.

Suydam, Marilyn N. (Ed.). Investigations with Calculators: Abstracts and Critical Analyses of Research - Supplement 2. Columbus, OH: Calculator Information Center, February 1981. ERIC: ED 199 086. Supplement 3, February 1982. ERIC: SE 036 233.

Timnick, Lois. Electronic Bullies. Psychology Today 16: 10-15; February 1982. The willingness of students to accept unreasonable answers from calculators is discussed.

Weaver, J. Fred. Calculators. In Mathematics Education Research: Implications for the 80's (E. Fennema, Ed.). Alexandria, VA: Association for Supervision and Curriculum Development, 1981. This chapter presents consequential research findings on calculator use in school settings, implications for instruction, and research directions needed in the 1980s.

MISCELLANEOUS, K-12

Gourdouze, Robbyn. Keeping Calculators Ready. Mathematics Teacher 74: 529-531; October 1981. Instructions are given for constructing a calculator bin storage rack.

Suydam, Marilyn N. Calculators: A Categorized Compilation of References - Supplement 1. Columbus, OH: Calculator Information Center, December 1980. ERIC: ED 199 087. Supplement 2, March 1982. ERIC: SE 036 440.

Weaver, J. F. On Design Differences of Some RPN Calculators. MATYC Journal 15: 190-193; Fall 1981. Two designs of RPN calculators are compared: in one, the contents of the T register are always retained; in the other, the contents are lost whenever the problem involves a stack of more than three levels.

REFERENCES AT THE COLLEGE AND OTHER POST-SECONDARY LEVELS

Chirpich, Thomas P. Analysis of Student Laboratory Data - An Illustration of the Usefulness of an Inexpensive Programmable Pocket Calculator. Journal of Chemical Education 58: 436-437; May 1981. A programmable calculator is used to perform calculations in experiments on freezing point depression data.

Elich, Joseph and Elich, Carletta. College Algebra with Calculator Applications. Reading, MA: Addison-Wesley, 1982.

Elich, Joseph and Elich, Carletta. Precalculus with Calculator Applications. Reading, MA: Addison-Wesley, 1982.

Flanders, Harley and Price, Justin J. Precalculus Mathematics. Philadelphia, PA: Saunders, 1981.

Flanders, Harley and Price, Justin J. Trigonometry. Philadelphia, PA: Saunders, 1982.

Hector, Judith H. and Frandsen, Henry. Calculator Algorithms for Fractions with Community College Students. Journal for Research in Mathematics Education 12: 349-355; November 1981. No significant differences were found in the scores of groups using conventional algorithms, the algorithms plus calculators, or only calculators (converting to decimals).

Henrici, Peter. Essentials of Numerical Analysis with Pocket Calculator Demonstrations. New York: Wiley, 1982.

Hestenes, Marshall and Hill, Richard. College Algebra with Calculators. Englewood Cliffs, NJ: Prentice-Hall, 1982.

Hyatt, Herman R. A Curriculum Note on a Hand-Held Calculator Course. Mathematics and Computer Education 16: 56-57; Winter 1982.

Hyatt, Herman R. Trigonometry, A Calculator Approach. New York: Wiley, 1981.

Koop, Janice B. Calculator Use in the Community College Arithmetic Course. Journal for Research in Mathematics Education 13: 50-60; January 1982. No significant differences were found between groups using or not using calculators for instruction.

Price, Justin J. and Flanders, Harley. College Algebra. Philadelphia, PA: Saunders, 1982.

Price, Justin J. and Flanders, Harley. College Algebra & Trigonometry. Philadelphia, PA: Saunders, 1982.

Sutliff, R. Some Ideas for a College Level Calculator Usage Course. MATYC Journal 15: 215-219; Fall 1981.

Weiss, J. B. and Weiss, J. Use of the Talking Calculator to Improve Mathematical Skills. Journal of Visual Impairment and Blindness 75: 61; 1981. Visually impaired adults increased mathematics scores after training in basic arithmetic skills with a talking calculator.

This bulletin was prepared by Marilyn N. Suydam, with the aid of Marsha Mueller and Kathryn McCulloch.

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Reference Bulletin No. 30
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REFERENCES TO CALCULATOR USES IN EDUCATION

References were selected from those collected since Bulletin No. 29 was compiled in April 1982. They are grouped by type and by level.

ACTIVITIES FOR STUDENTS, K-12

Bernard, Julian. More Meaning Power to the Zero Power. Mathematics Teacher 75: 251-252; March 1982. An intuitive preparation for $n^0 = 1$ is provided through use of successive square roots.

Billstein, Rick and Lott, Johnny W. More Reflections on Teaching Mathematics for Elementary School Teachers. Arithmetic Teacher 29: 37-38; January 1982. Calculators are an integral part of the methods courses for elementary teachers described here.

Brockmann, Ellen M. (Ed.). Teaching Handicapped Students Mathematics: A Resource Handbook for K-12 Teachers. Washington: NEA, 1981. One paper in this book is concerned with exceptional students' needs and the calculator.

Fisher, William B. and Jones, Jim N. Large Numbers and the Calculator. In Mathematics for the Middle Grades (5-9) (L. Silvey and J. R. Smart, Eds.). 1982 Yearbook. Reston, VA: National Council of Teachers of Mathematics, 1982. Pp. 130-141. A series of lessons that have been presented to children in grades 4-9 is summarized.

Goldberg, Kenneth P. Pushbutton Mathematics: Calculator Math Problems, Examples, and Activities. Englewood Cliffs, NJ: Prentice-Hall, 1982. This book is for the teacher who wants to know more about calculators, how they differ, how to select one, and how to teach with one.

Higgins, Jon L. and Kirschner, Vicky (Eds.). Calculators, Computers, and Classrooms. Columbus, OH: ERIC/SMEAC, December 1981. Calculator articles in this compilation relate to the curriculum, cautions, problem solving, and classroom applications.

Miller, John D. Calculators in Elementary Mathematics Instruction: An Information Exchange. Berkeley: University of California, August 1979 and May 1981. ERIC: SE 035 873, SE 035 874. This report on workshops includes teaching ideas and activities.

Mohler, Lee and Hoffman, Dean. Mathematical Recreations for the Programmable Calculator. Rochelle Park, NJ: Hayden, 1982. Activities are presented with a step-by-step approach.

Olson, Melfried and Sindt, Vincent G. Examining Rates of Inflation and Consumption. Mathematics Teacher 75: 472-473; September 1982. Calculators are used to complete tables for three worksheets illustrating concepts.

Seber, Robert E. Systems of Linear Equations with Mini-calculators or Computers. School Science and Mathematics 81: 512-516; October 1981. A successive approximation method is presented, with curricular implications noted.

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RESEARCH REPORTS, K-12

Sigg, Paul O. The Hand-Held Calculator: Effects on Mathematical Abilities and Implications for Curriculum Change. South Bend: Indiana University at South Bend, June 1982. ERIC: SE 038 272. Over 20 studies are abstracted and summarized in this review.

Turinese, David M. A Use of the Hand Calculator in the Second Year Algebra Curriculum. (Boston University, 1982.) Dissertation Abstracts International 43A: 102; July 1982. Calculator materials were more effective for achieving a basic level of understanding than was a textbook approach, but only equally effective for achieving a higher level of understanding.

Wheatley, Garyson, H. and Wheatley, Charlotte L. Calculator Use and Problem Solving Strategies of Grade Six Pupils. Final Report. West Lafayette, IN: Purdue University, April 1982. ERIC: SE 038 752. Pupils using calculators made fewer computational errors and required significantly less time to complete problems.

REFERENCES AT THE COLLEGE AND OTHER POST-SECONDARY LEVELS

Bevis, Jean H. and Boal, Jan L. Continued Fractions and Iterative Processes. Two-Year College Mathematics Journal 13: 122-127; March 1982.

Fallbeck, Patricia D. The Use of Hand-Held Calculators in the Instruction of Addition Combinations with Retarded Adults. (University of Northern Colorado, 1982.) Dissertation Abstracts International 43A: 101-102; July 1982.

Gimmestad, Beverly J. The Impact of the Calculator on the Content Validity of Advanced Placement Calculus Problems. Houghton: Michigan Technological University, June 1982. ERIC: SE 037 427.

Groneman, Nancy J. Business Mathematics Using Electronic Calculators. Englewood Cliffs, NJ: Prentice-Hall, 1982.

Hestenes, Marshall D. and Hill, Richard O. Trigonometry with Calculators. Englewood Cliffs, NJ: Prentice-Hall, 1982.

Kennedy, John H. Balancing Chemical Equations with a Calculator. Journal of Chemical Education 59: 523-524; June 1982.

Sharp, Vicki F. How to Solve Statistical Problems with Your Pocket Calculator. Blue Ridge Summit, PA: Tab Books, 1982.

Snover, Stephen L. and Spikell, Mark A. Programming the TI-55 Slide Rule Calculator. Englewood Cliffs, NJ: Prentice-Hall, 1982.

Tontsch, John W. Applied Electronic Math, with Calculators. San Francisco: Science Research Associates, 1982.

This bulletin was prepared by Marilyn N. Suydam, with the aid of Mary Margand, Katie McCulloch, and Marsha Mueller.

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